CLAIMS

WHAT IS CLAIMED IS:

1. A viscosity measurement apparatus comprising:

a fluid flow channel;

a heating element arranged at least around an exterior portion of the fluid flow channel proximate an inlet end; and

a temperature sensor disposed within the fluid flow channel downstream from the heating element, wherein the arrangement of the heating element relative to the fluid flow channel reduces a possibility of turbulence formation in a fluid passing therethrough.

2. The apparatus of claim 1, further comprising a thermally insulating jacket disposed around the heating element and the fluid flow channel.

3. The apparatus of claim 1, wherein the fluid flow channel comprises a tube having an inner diameter from approximately 2 millimeters (0.08 inches) to approximately 3.5 millimeters (0.14 inches).

4. The apparatus of claim 1, wherein the fluid flow channel further comprises a constant inner diameter.

5. The apparatus of claim 1, wherein the temperature sensor is positioned from approximately 3 millimeters (0.12 inches) to approximately 10 millimeters (0.4 inches) downstream from the heating element.

6. The apparatus of claim 1, wherein the fluid flow channel further comprises:

an upstream portion comprising a comparatively high thermally conductive material; and

a downstream portion comprising a comparatively low thermally conductive material.

7. The apparatus of claim 6, wherein the upstream portion comprises a metal selected from the group consisting of copper and aluminum.

8. An oil viscosity measurement system for internal combustion engines comprising:

a tubular flow guide for receiving oil at an inlet end and discharging the oil at an outlet end;

a heating element disposed around an exterior portion of the tubular flow guide proximate the inlet end for heating oil entering the inlet end; and

a temperature sensor disposed within the tubular flow guide proximate the outlet end for measuring a temperature of oil proximate the sensor.

9. The system of claim 8, further comprising an insulating jacket disposed around the heating element and the tubular flow guide for reducing heat transfer between a first portion of oil located in the tubular flow guide and a second portion of oil outside the tubular flow guide.

10. The system of claim 8, wherein the tubular flow guide comprises a constant inner diameter from approximately 2 millimeters (0.08 inches) to approximately 3.5 millimeters (0.14 inches) along a length of the flow guide.

11. The system of claim 8, wherein the temperature sensor is positioned from approximately 3 millimeters (0.12 inches) to approximately 10 millimeters (0.4 inches) from the heating element.

12. The system of claim 8, further comprising a controller for regulating the heating element and reading the temperature sensor.

13. The system of claim 12, wherein the controller further comprises:

a memory for storing temperature readings from the temperature sensor; and

a processor for comparing characteristics of the stored temperature readings over time to temperature characteristics for known oil viscosities to determine the viscosity of the oil.

14. The system of claim 12, further comprising a look up table for storing the temperature characteristics for the known oil viscosities.

15. A method for measuring viscosity of a fluid comprising:

immersing a fluid flow channel in the fluid;

heating a portion of the fluid in the fluid flow channel proximate an inlet end of the fluid flow channel; and

measuring a temperature of the fluid in the fluid flow channel at a position downstream from the inlet end of the fluid flow channel.

16. The method of claim 15, further comprising orienting the fluid flow channel in a direction parallel to a force indicative of Earth's gravity.

17. The method of claim 15, further comprising:

recording temperature changes of the fluid for a time period; and

comparing recorded temperature change characteristics to temperature change characteristics for known fluid viscosities to determine the viscosity of the fluid.

18. The method of claim 15, further comprising heating the fluid from approximately 2 to approximately 3 minutes.

19. The viscosity measurement apparatus of claim 1 in combination with a lubricated component in a vehicle.

20. The apparatus of claim 19, wherein the lubricated component is selected from the group consisting of an engine and a transmission.